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The Carrier Unit Air Conditioner

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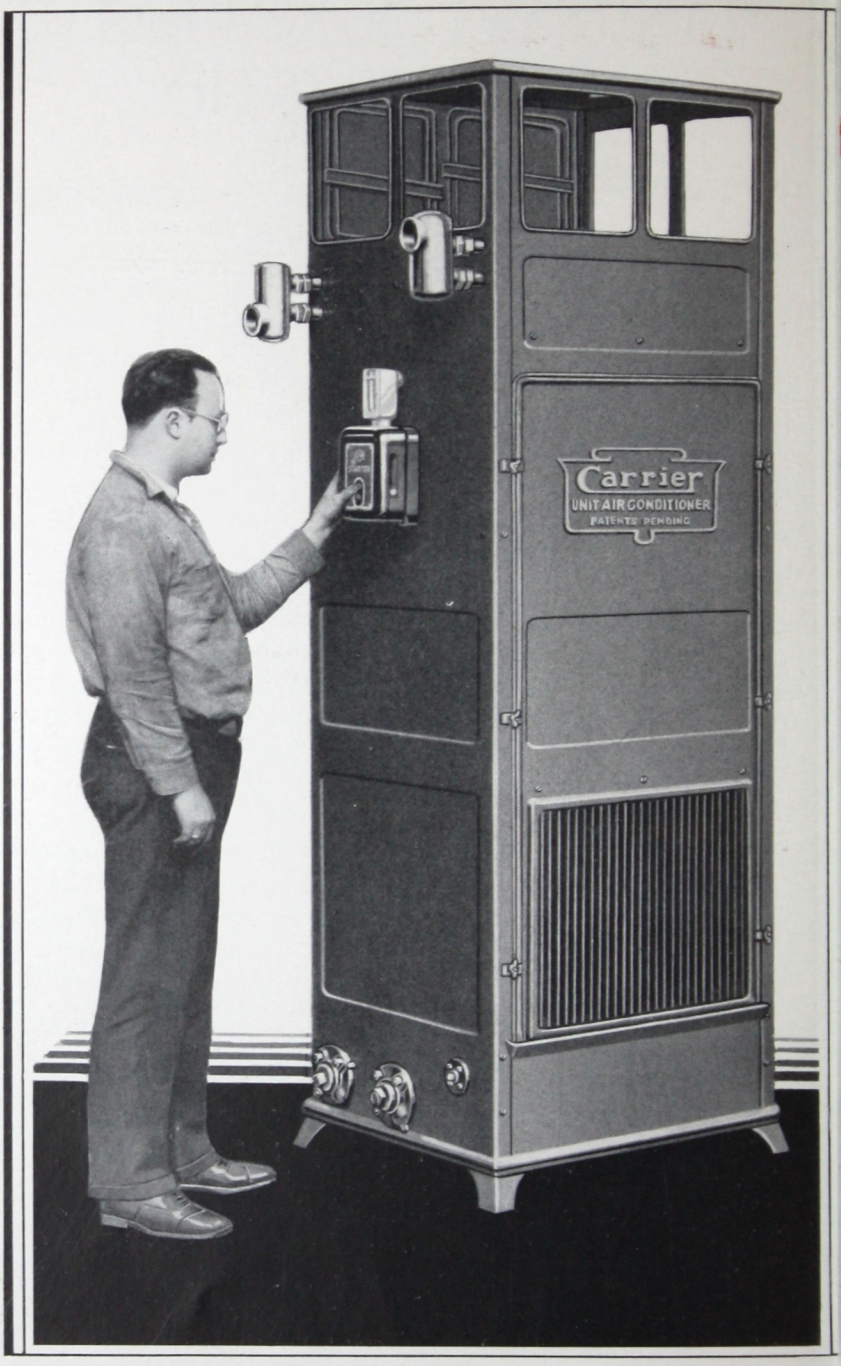
MANUFACTURED WEATHER AND INDUSTRY

IN more than two hundred industries the science of Air Conditioning is creating and controlling automatically the atmospheric conditions found most suitable for materials and manufacturing processes. Popularly this science is known as Manufactured Weather. An apt description; we utilize mechanical equipment to extract moisture from or add moisture to the air within a building, to raise or lower the temperature at will, to direct the flow of air and control its velocity, to free the air from the dust and dirt prevalent in the outdoor atmosphere or gathered from the work-room,—*we do actually Manufacture Weather.* ¶ Always the weaver and the spinner have sought moist air in which to handle textile fibres. Today the *great* mills have Manufactured Weather and are built, without regard to climatic conditions, in the midst of the cotton fields or where the economic factors of labor, power and transportation are found most desirable. ¶ In an atmosphere of Manufactured Weather, cigars and cigarettes are now produced by automatic machines, turning out inconceivable quantities with a speed and uniformity of perfection never approached by the old hand methods. ¶ The confectioner and the printer turn to Manufactured Weather; the one to assure an appetizing, glossy surface on his confections, the other to control the fickle changes of weather-sensitive paper. ¶ In these, and as we have said, in some two hundred other industries, producing articles familiar in the daily lives of all of us, Manufactured Weather has become the useful and often indispensable servant of the progressive manufacturer; freeing him from daily weather uncertainties, improving the quality of his product, contributing to the health, efficiency and happiness of his workers.

Carrier
AIR CONDITIONING
DRYING EQUIPMENT



The
Carrier Unit
Air Conditioner.
Manufactured Weather
at the touch
of a button.

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT

THOUGH Manufactured Weather has been adopted by a great and varied field of industries and though, within the last 12 years, Carrier Engineers have designed and installed nearly three thousand systems to provide proper air conditions for the drying or processing of materials, for the improvement of manufacturing operations or for the health and comfort of people; there are yet hundreds of industries and thousands of manufacturers who have failed to bring into their factories, laboratories or offices, the revolutionizing advantages that Manufactured Weather has given to other industries and other manufacturers.

Thousands of factories operate under climatic and weather difficulties which can be corrected by Manufactured Weather.

In some instances this has seemed to indicate a lack of progressiveness, a trace of the same lethargy which some have shown toward proper lighting, toward modern mechanical conveying and trucking methods and toward the innumerable modern appliances upon which American Industry has so rapidly advanced.

On the other hand, Air Conditioning Engineers have been faced with the problem of providing adequate air conditioning equipment for the smaller manufacturer. His materials are not less influenced by fickle weather and seasonal conditions than those of the manufacturer engaged in large scale production. Yet, in many cases the initial investment in a system to create and control the desired atmospheric conditions suited to his processes has proved prohibitive.

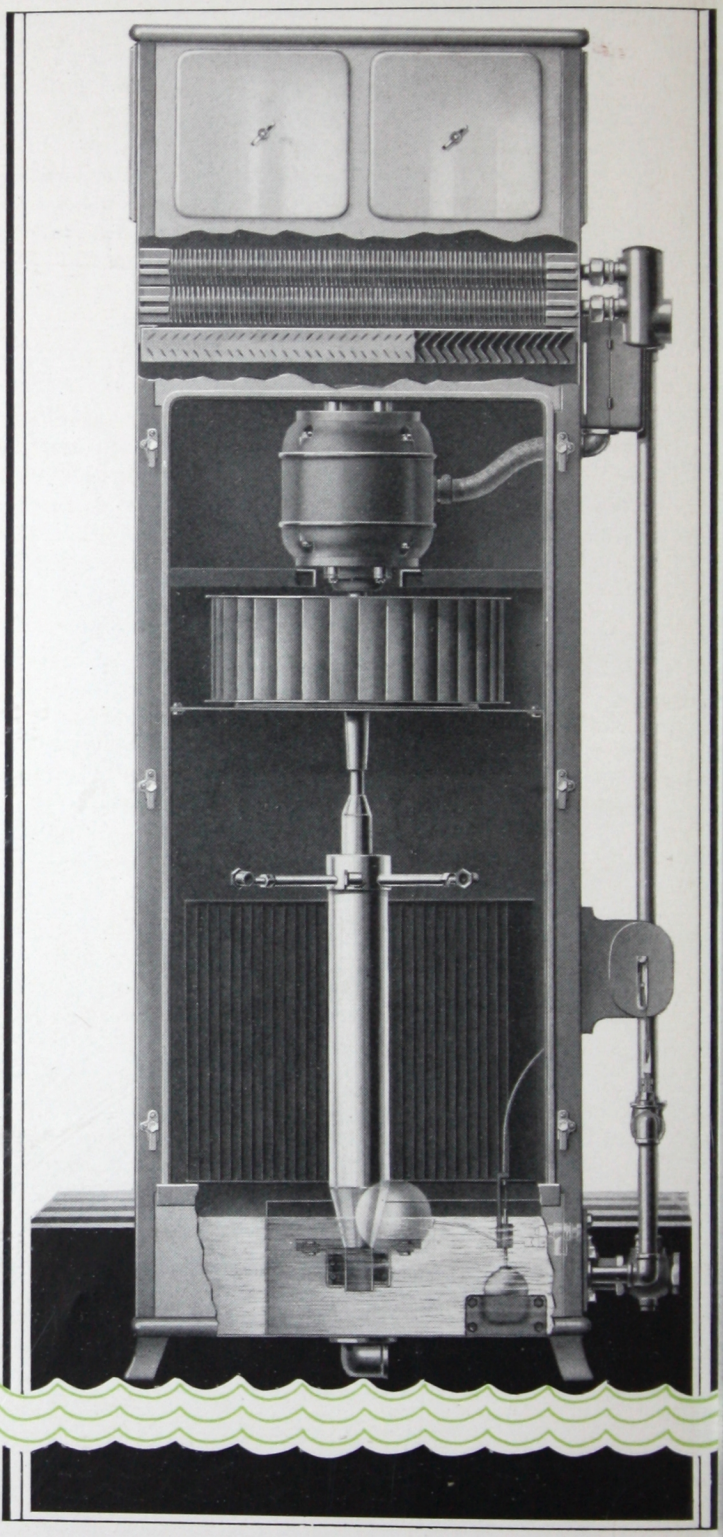
The Carrier Unit Air Conditioner is a revolutionary development, making Manufactered Weather available to *any* factory, however small.

With the purpose of meeting this problem and in order to make Manufactured Weather available to *any* producer whose materials or processes are affected by variable atmospheric conditions, the Engineering, Design and Research Departments of Carrier Engineering Corporation led by Willis H. Carrier, undertook the design and development of the *Carrier Unit Air Conditioner*. The result is not a miniature copy of the Central Station Humidifier which is used in connection with a metal duct air distribution system, it is not a spray device which throws free moisture into the room with a small amount of air circulation, but involves a series of revolutionary developments in the handling and conditioning of air which, in their combination, have formed a unit capable of performing efficiently every function of the complete Carrier Central Station system for air conditioning.

The Carrier Unit Air Conditioner does not, however, supersede the standard Carrier Central Station System but is designed to complement such a system and to meet the requirements of a vast number of smaller factories or departments in which the more elaborate equipment has seemed to require an excessive initial investment or where other conditions have presented obstacles to adaptability, such as obsolete or temporarily tenanted buildings.

So, through the Carrier Unit Air Conditioner, Manufactured Weather is available to *any* manufacturer in *any* industry and with it the services of Carrier Engineers backed by their many years experience in this specialized field.

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT



The Interior
of the Carrier Unit
Air Conditioner.
A complete
Air Conditioning
System.

Carrier
AIR CONDITIONING
AND
DRYING EQUIPMENT

REFERENCE to the very lucid illustrations on the opposite and following pages and to the details featured in the succeeding pages will bring very clearly to the interested manufacturer or engineer, the extreme compactness, the ultra simplicity and the unique features of Carrier Unit Air Conditioner.

The Unit is compact. It occupies less than half the space of your office desk.

Follow then, the details as presented in these photographs. Here is a cabinet 7 feet 8 inches in height, the lateral dimensions are 2 feet 6 inches by 2 feet 8 inches, less than half the floor space occupied by your office desk. The casing is an assembly of die stamped and welded steel plates, the entire surface of which is finished in a green baked enamel like the modern filing cabinets in your office. On opposite sides of the cabinet are two readily removable panels. The lower part of each of these is equipped with the baffle plates through which air is admitted to the Unit. At the top of the cabinet on all four sides are the air distribution outlets which may be closed or opened providing full flexibility for air distribution in any or all directions from the cabinet.

The Unit is Portable.

Here is an air conditioning unit that is portable. Its location within a room may be changed with a very minimum of difficulty. Or, if you are in a rented building which you expect some day to vacate, you will be able to move the Units along with your other equipment. Here is an air conditioning unit that requires only the simplest water, steam and electrical connections to prepare it for operation.

Only the most simple water, steam and electrical connections are required.

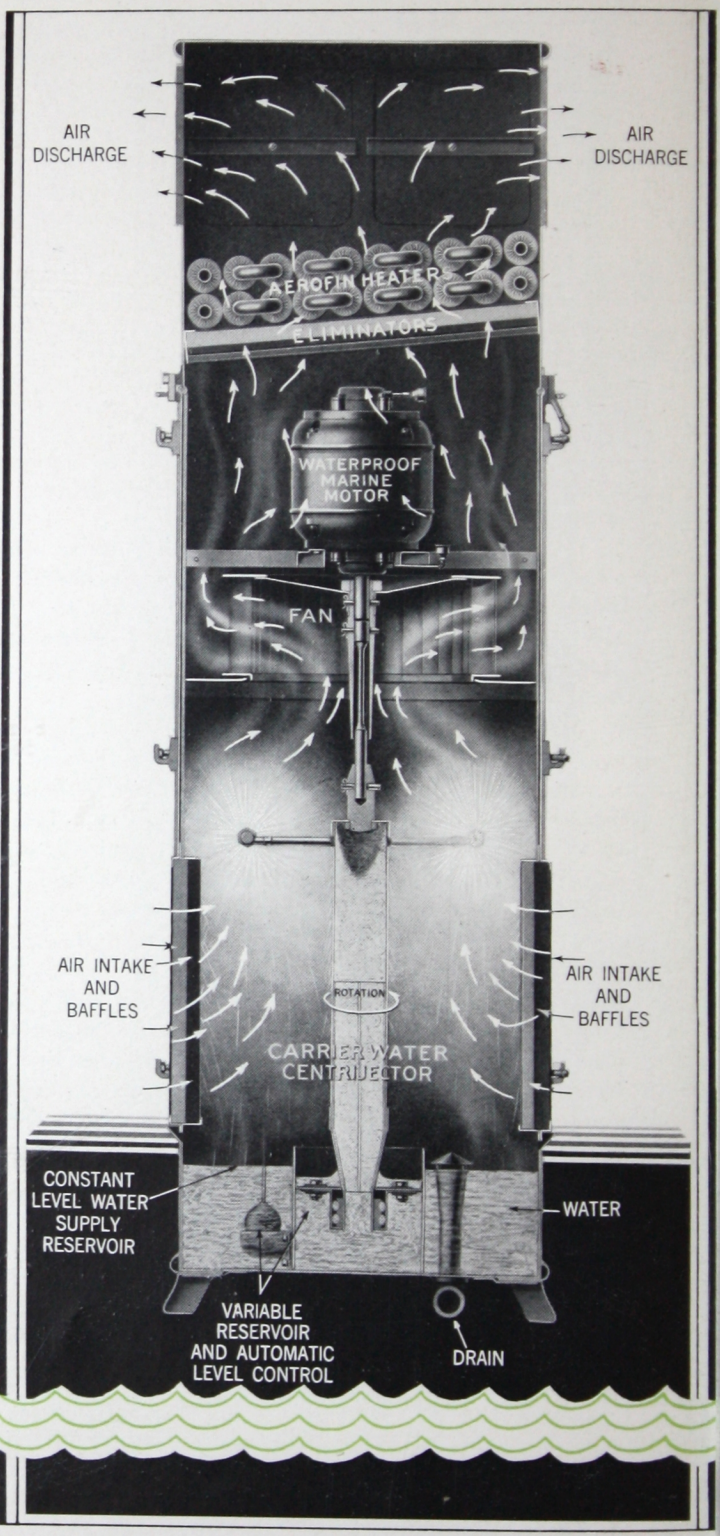
As we examine the interior of the cabinet and its fittings, it is well to begin with an outline the functions that are there to be accomplished:

Speaking broadly, the purpose is to *condition the air* which is drawn into and delivered from the Unit; adhering to our theme, the purpose is to *Manufacture Weather*. Specifically, the purpose is to wash the air, to reduce or increase and control the atmospheric humidity according to requirements, to heat or cool the air according to requirements and to circulate the air uniformly through the room to be conditioned.

A single 1 h.-p. motor does the work. Mechanical equipment is simple, efficient and fool-proof.

The whole mechanical equipment of the Unit is simple, fool-proof and efficient beyond comparison. Here is a unit with a capacity to deliver 2500 cubic feet of conditioned air per minute, sufficient to provide a complete change of air each ten minutes in a room 25 feet by 100 feet by 10 feet. Here is a unit capable of spraying 27 gallons of water per minute at a pressure of 40 pounds per square inch, sufficient to saturate completely the air passing through the Unit at any temperature over a very wide range; sufficient to produce unusually effective results when refrigerated water is used to accomplish cooling and dehumidification. Here is a unit containing within itself heating capacity sufficient to replace all inefficient cast iron or pipe coil radiators that might ordinarily be used in the room. A single 1 horse-power, totally enclosed, marine motor performs this entire work; an efficiency never before approached in air conditioning equipment.

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT



The Carrier Unit Air Conditioner showing in detail the construction and operation.

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT

LOOKING at the Unit in section, we see that the bottom is a constant level water reservoir communicating with an inner reservoir to which the water may be admitted or cut off by automatic control.

The operation of the Unit is here described.

From the inner reservoir the water is drawn centrifugally into the Carrier Water Centrijector, a most novel device described more fully on page 10. From the Centrijector the water is discharged in a dense spray through nozzles located at the ends of pipes attached radially to the revolving Centrijector.

The Water Centrijector.

Absolute assurance against vibration is provided by the self-aligning features of the hollow tube, Water Centrijector. It is connected to the motor through the fan, above, by a rustless steel, flexible coupling carried in a safety sleeve which limits the deflection. At the bottom the hollow tube is carried in a self-aligning, oil-less bushing supported by rubber rings.

Trace the course of the air and its treatment as it passes through the Unit.

Now, trace the course of the air and its treatment as it passes through the Unit. The air is drawn from the room or from a connection leading outdoors through the large area of baffle plates shown in the lower part of the side panels. These plates allow the free passage of air but prevent the escape of the water spray. As the air is drawn in, it comes immediately into contact with a dense cloud of finely atomized water. The effect here is to wash the air thoroughly, freeing it from all dust and solid matter, and to saturate the air completely at the temperature of the spray water.

Establishing humidity control.

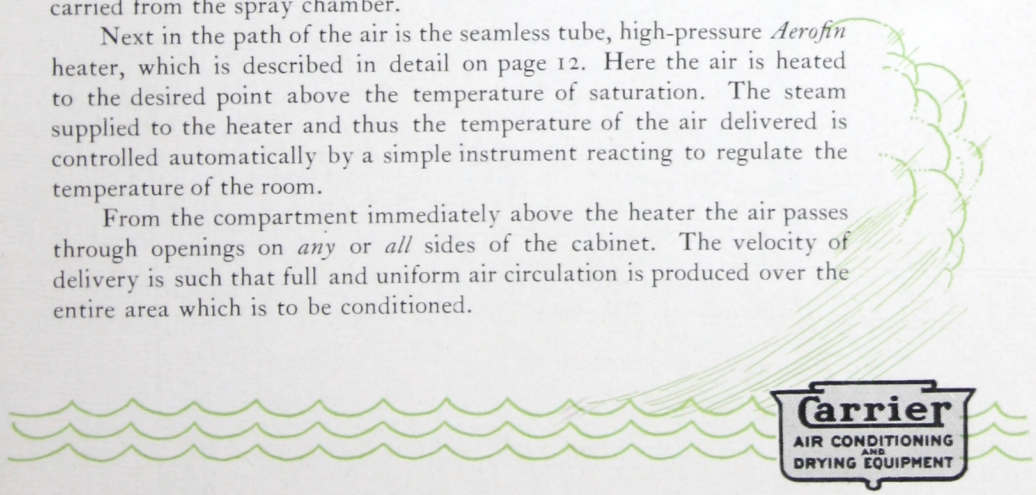
In saturating the air, we have established the very basis for humidity control. Automatic control of the temperature and the quantity of water sprayed from the Centrijector provides a means to control accurately the quantity of water-vapor carried by the air and ultimately a most accurate control of the Relative Humidity of the atmosphere in the room supplied.

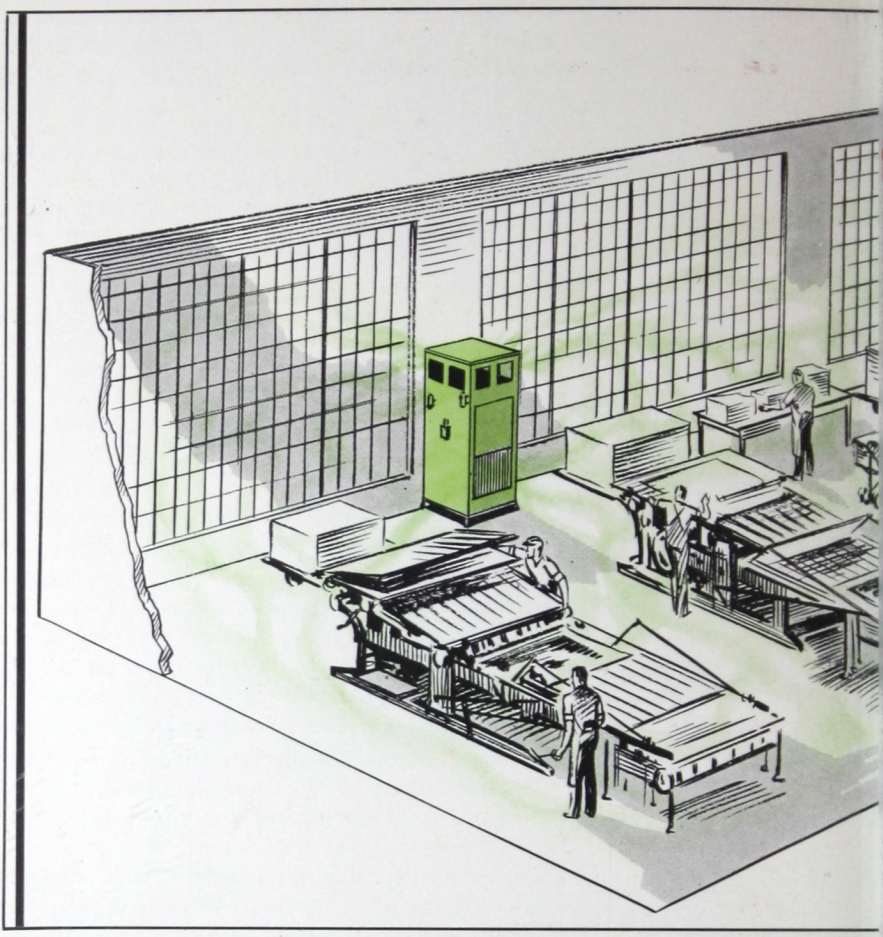
The free moisture eliminators. The Heaters. Uniform air distribution.

The saturated air is drawn vertically into a centrifugal fan of special design. The fan discharges the air at full pressure into the upper part of the cabinet, thence to the eliminators, a series of metal plates arranged across the entire area of the cabinet, which allow the free passage of the air but obstruct the passage of all particulars of free, unevaporated water carried from the spray chamber.

Next in the path of the air is the seamless tube, high-pressure *Aerofin* heater, which is described in detail on page 12. Here the air is heated to the desired point above the temperature of saturation. The steam supplied to the heater and thus the temperature of the air delivered is controlled automatically by a simple instrument reacting to regulate the temperature of the room.

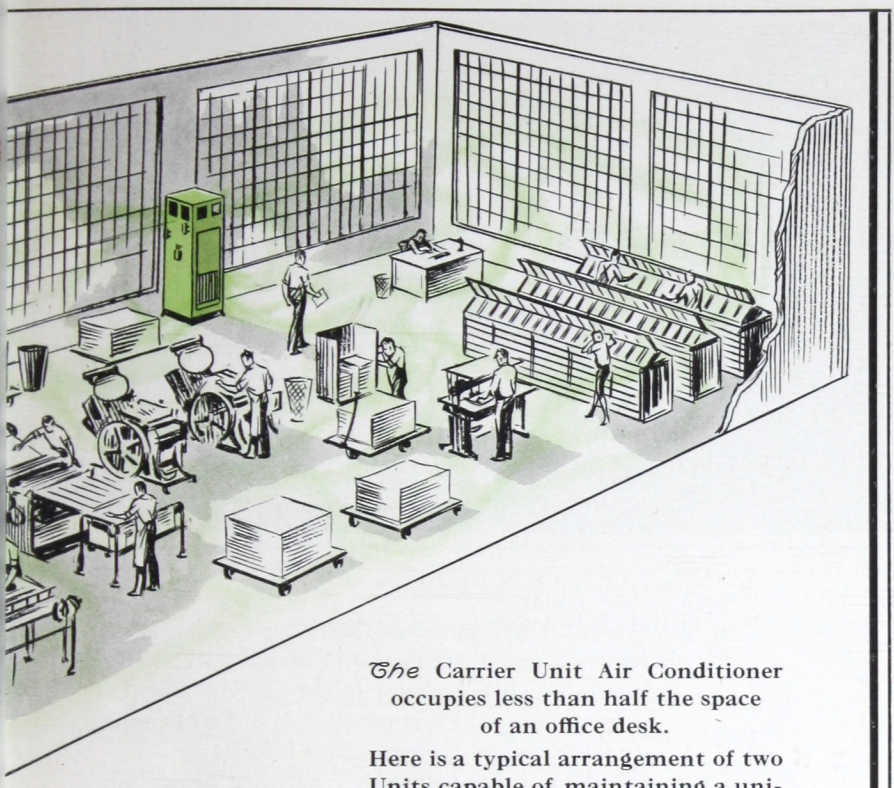
From the compartment immediately above the heater the air passes through openings on *any* or *all* sides of the cabinet. The velocity of delivery is such that full and uniform air circulation is produced over the entire area which is to be conditioned.





PRINTING and Lithographic Plants, Candy Factories, Textile Mills, Textile Conditioning Rooms and Testing Laboratories, Tobacco Factories, Shoe Factories, Tanneries, Chemical and Drug Plants, Paper Box Factories, Paper Conditioning Rooms and Testing Laboratories, Tobacco Jobbers' Store Rooms, Candy Jobbers' Store Rooms, Scientific Laboratories, Rubber Products Factories, Rubber Conditioning and Testing Laboratories, Fine Wood Working and Furniture Factories; Lacquer and Varnish Application Rooms; Photographic Film Manufacturing, Finishing and Storage Rooms; General Work Rooms.

In all such rooms, laboratories and factories, the Carrier Unit Air Conditioner is adaptable. In fact, wherever there is a product or a



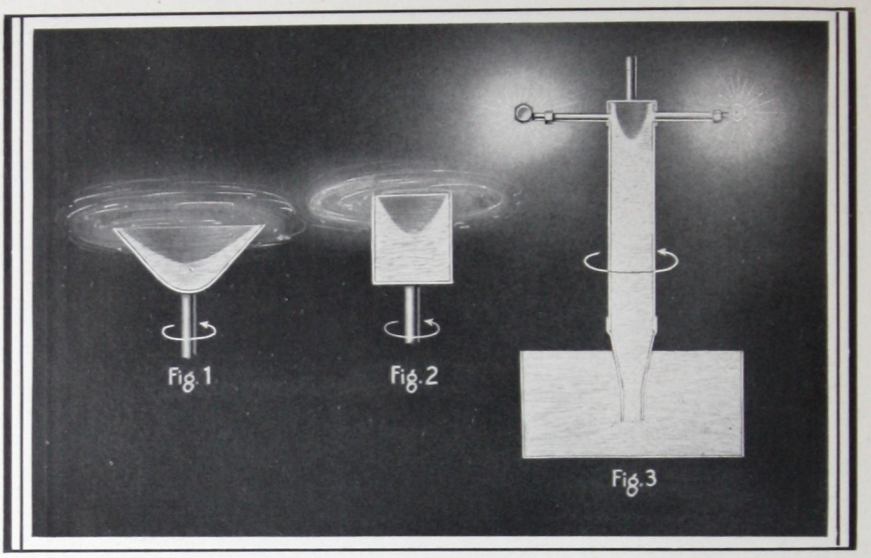
The **Carrier Unit Air Conditioner occupies less than half the space of an office desk.**

Here is a typical arrangement of two Units capable of maintaining a uniform circulation of clean conditioned air in every part of the work-room.

process or an operation influenced adversely by the weather and seasonal conditions or variations, there is now a means of eliminating these difficulties through Manufactured Weather in *any* plant however small.

In all of the applications cited and in many others Carrier Engineers have had years of experience. They know intimately the processes and effects involved and they are experienced in the methods of creating and controlling the atmospheric conditions suited to each problem.

A report from any manufacturer according to the outline given on page 15 of this book will bring the recommendation and a cost estimate from our Engineering Department. If the problem seems unique and cannot be solved by this means, one of our Engineers will visit the plant, make a personal survey and submit a proposal without obligation to the manufacturer.



CENTRIJECTOR, the word is almost self-explanatory and perfectly descriptive of the novel spray system which is included in the Carrier Unit Air Conditioner. The Centrijector is a hollow tube shown in Figure 3, of the above illustration. *Centrifugal* action, produced by rotation, draws the water up into the tube. Under pressure, produced by rotation of the radial pipes, the water is *ejected* from the nozzles.

A glance at the sketches above will immediately relate the action in the Centrijector to the familiar action of a liquid in rotating vessels. However, instead of allowing the water to escape tangentially over the edge of the vessel, the water passes to six radial pipes where a pressure is set up proportional to the speed of rotation.

A Carrier Spray Nozzle is affixed to each of the pipes. The unusually large nozzle orifice, having a diameter of approximately ¼ inch, makes them practically non-clogging. The water is discharged from the nozzles at right angles to the pipes and backward; that is, contrary to the direction of rotation. Herein, ingenious advantage is taken of a very familiar physical phenomenon. The reaction of the discharging water serves to drive the rotating pipes forward, much as a revolving water sprinkler, thus recovering an appreciable percentage of the power expended in rotation. The effect of this *reaction* is to create a finely atomized, very

dense and almost stationary spray across the stream of entering air. The result is a spray system using from 1/7 to 1/3 of the power required by centrifugal pumps of various efficiencies, delivering the same quantity of water at the same pressure to stationary spray nozzles.

A spray system requiring less than ⅓ of the power of usual centrifugal pumps.

The Centrijector sprays 27 gallons per minute at a pressure at the nozzles of 40 pounds per square inch with a measured power consumption of 4/10 horse-power.

The Fan used in the Carrier Unit Air Conditioner was designed especially to meet the requirements of perfectly balanced and noiseless operation, simplicity and high efficiency. It is of the multi-blade centrifugal type. The blades are curved backward with reference to the direction of rotation.

A highly efficient fan of special design.

The reaction of the air, as it is discharged from the backward curved blades, is very similar to that described for the spray in the Carrier Water Centrijector, with a comparable, high efficiency characteristic. The air leaves the blades at very low velocity and full pressure is developed immediately within the unit casing.

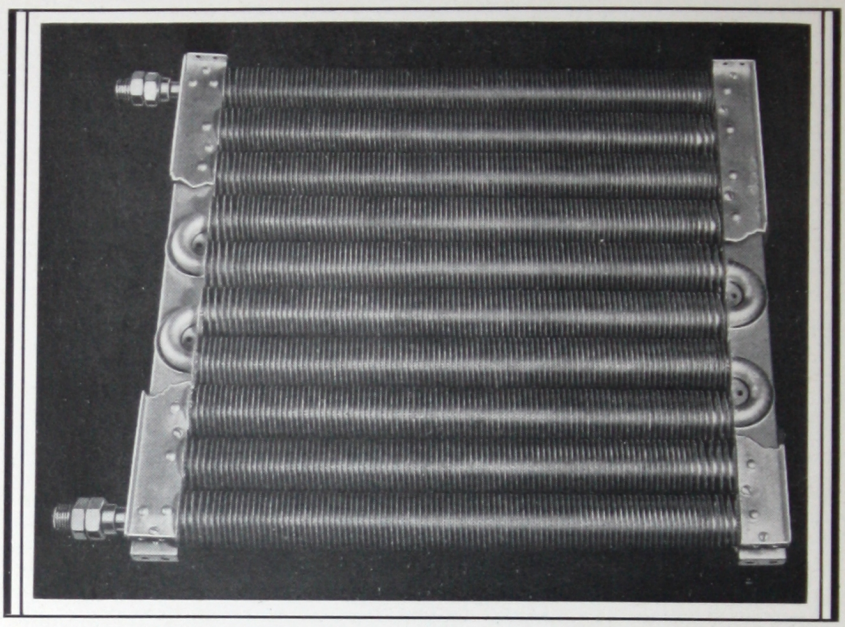
The static efficiency (i.e., the ratio of the air horse-power, based on static pressure to brake horse-power) is above 50 per cent, which compares favorably with the best centrifugal fan practice. The fan, as operated in the standard unit, handles 2500 cubic feet of air per minute with a measured power consumption of 6/10 horse-power.

The Motor which drives the fan and centrijector is of special design. It is totally enclosed to prevent the entry of moisture, and as an additional precaution, the windings are moisture proofed by special impregnation. The motor is arranged for vertical operation. The shaft is of corrosion—resisting nickel steel operating on ball-bearings. Lubrication is provided through two grease cups.

High motor efficiency thru ideal cooling.

When the sprays and fan are in operation the motor is surrounded by a moving atmosphere carrying only the finest mist of atomized water. Following a thorough test under operating conditions in the unit the motor manufacturers wrote, "During the full load to constant temperature test it was found that the temperature rise was so small as to be almost negligible. This was due entirely to the fact that 2500 cubic feet of saturated air per minute is passed directly over the motor. As a result of these ideal operating conditions, the thermal capacity of the motor is greatly increased, its horse-power is kept down to a minimum and its operation at the highest possible efficiency is assured."

The motors for the standard Unit are rated at 1 h.-p., 1160 r.p.m., and may be furnished for operation on single phase, polyphase or direct current circuits. The polyphase motors are furnished with windings so arranged that they may be operated at either 220 or 440 volts without internal winding changes.



INDIRECT heating surfaces, operating in conjunction with fan systems of air circulation, have proved a revolutionary step toward heating efficiency and have provided a flexibility of temperature control not to be compared with cast iron and pipe coil surfaces depending upon convection currents for heat distribution.

The Carrier Unit Air Conditioner is equipped with standard *Aerofin*, continuous copper tube, non-corrosive, extended surface heating sections, as shown in the illustration above, capable of operating at steam pressures up to 350 pounds (tested at 1000 pounds hydrostatic pressure). According to the heating requirements, the Units may be equipped with sufficient heating surface to replace entirely the direct radiation ordinarily used in a room and offer a means of effective and efficient heating in addition to the advantages of complete air conditioning.

The notable efficiency and compactness of the Aerofin sections compared with cast iron surface equivalents are evidenced in the table below.

Performance Tables for Aerofin Heaters:

Single Row				*Two Row*			
Entering Air Temp. ° F.	Steam Pressure Pounds	Final Air Temp. ° F.	Equivalent Cast Iron Wall Rad. Sq. Ft.	Entering Air Temp. ° F.	Steam Pressure Pounds	Final Air Temp. ° F.	Equivalent Cast Iron Wall Rad. Sq. Ft.
60	5	97	295	60	5	125	600
"	50	113	470	"	50	154	920
"	100	119	540	"	100	168	1075

AS an air conditioning system the Carrier Unit Air Conditioner offers advantages over the ordinary heating and ventilating system which far outweigh any difference in cost.

A Heating Unit offering the added advantages of complete Air Conditioning.

In this Unit, equipment is provided which not only heats the air but effectively washes the air, freeing it from all dust and solid matter, accurately establishes and controls the condition of humidity and finally, circulates the conditioned air uniformly throughout the room.

Properly adjusted conditions of temperature humidity and air movement contribute to health and efficiency of workers.

Conditions of humidity and air movement properly adjusted in relation to the air temperature are now recognized by health authorities as of paramount importance to the productiveness and the well-being of workers. Many manufacturers, who have installed air conditioning equipment primarily to control the effect upon materials or upon manufacturing operations, now state that the incidental improvement in the health and efficiency of the employees is alone sufficient to justify the investment.

In certain buildings wherein much heat is generated by power driven machinery or from other sources involved in the manufacturing operations or during hot seasons when heat is transmitted into the building, *evaporative cooling* of the air, which occurs in the spray chamber of the Unit, is sufficient to reduce the temperature of the air in the conditioned room from 5 to 20 degrees below the existing outdoor temperature. Though *evaporative cooling* is limited according to the relative humidity of the air entering the spray chamber of the Unit, the general effectiveness contributes to the comfort of the workers and offers an efficient means of utilizing or disposing of the mechanical heat developed by operating machinery or that given off from other sources.

Evaporative cooling.

In the usual practice of air washing, humidifying and evaporative cooling, the water in the tank of the Unit is used over and over. It is necessary to replace or make up only that which has been evaporated by the air passing through the Unit. From the detailed illustration on the earlier pages of the book it will be seen that connection is made to the general water supply and that from this source a constant water level is maintained through a float valve. Under average operating conditions the water evaporated by one Unit amounts to about three-quarters of a pound per minute or between 40 and 50 gallons in 12 hours.

Water consumption only replacement of that evaporated.

Of course, it is necessary to drain and flush the water tank periodically according to the amount of dirt washed from the air.

Cold and refrigerated water for cooling and dehumidifying.

When it is desired to maintain conditions of temperature and humidity below those normally possible to obtain by *evaporative cooling* it is necessary to supply water to the Unit at a temperature below the *dew-point* or saturation temperature of the entering air. The source of low temperature water may be from a well or the water may be cooled by refrigeration.

Where refrigeration equipment is required for operation in conjunction with the Units, Carrier Engineers will accept the responsibility for

the design and installation of the system or will adapt the air conditioning Units to existing refrigeration equipment.

The Unit Air Conditioner is made up of standardized parts.

The Carrier Unit Air Conditioner is a highly standardized product with each part made universally adaptable and interchangeable in any Unit. Through a large investment in dies, die stamping and machining equipment, all of the economies of quantity production have been effected and it is possible to offer this equipment at lower prices than have obtained heretofore in the installation of small capacity air conditioning systems.

Standard combinations of automatic control instrument to suit any condition.

Automatic humidity and temperature control instruments are provided with each Unit to meet the particular requirements imposed by the air conditions which are to be maintained. There are twelve standard control combinations one of which will be prescribed upon examination of the requirements in each application. In this respect only, has complete standardization been advisedly avoided. All of the automatic instruments are based in application and design on the long experience of Carrier Engineers, all are of Carrier design or built on Carrier specifications.

Guarantee.

Each Unit with its automatic control system is guaranteed against all mechanical defects and guaranteed with reference to its capacity performance.

Prices F. O. B. Factory.

The Carrier Unit Air Conditioner is sold F.O.B. at the Carrier Factory at a fixed base price plus a variable price according to the combination of control instruments with which it is to be equipped.

A thirty-one day test in your factory before purchase.

Our faith in the ready and wide adaptability and performance of these units has permitted the adoption of a sales policy which allows any responsible firm or individual to test the equipment thoroughly for a period of 31 days before final purchase. At the end of this period payment may be made or the equipment returned to our factory without further obligation.

The basis for estimating Air Conditioning capacity.

Air Conditioning capacity cannot, in general, be calculated on the basis of square feet of floor space or upon the cubical content of a room. It is based, rather, upon the heat units to be supplied or absorbed. For instance, one room of 25,000 cubic feet may contain machinery giving off 100 horse-power or 4240 British thermal units per minute while a room of like volume may contain machinery or heat sources dissipating twice this quantity. Such conditions control the calculation of air conditioning requirements.

For your convenience and ours, we have outlined a set of questions on the following page. Most of these can be answered from your general knowledge of the plant. Some may require that measurements be made and other data taken.

From this information, our Engineering Department will estimate carefully the required air conditioning capacity and will submit to you the price of the Unit or Units and controls which they deem necessary. Or, as previously stated, if your problem seems unusual or unique, we shall be pleased to send one of our experienced engineers to investigate and discuss with you the details of your requirements. This, of course, would be without obligation to you.

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT

QUESTIONNAIRE

for Unit Air Conditioner Application

Name.....

Address.....

1. For what is the room used?.....
2. What conditions are desired? (*a*) Temperature.....° F.
   (*b*) Humidity.....per cent.
3. What size is room? Long....., Wide....., High.....
4. What construction is room?
   (*a*) Windows—Single.....Sq. Ft., Double.....Sq. Ft.
   (*b*) Skylight—Single.....Sq. Ft., Double.....Sq. Ft.
   (*c*) Outside wall—Material....., Thickness....., Surface.....
   Sq. Ft.
   (*d*) Partitions, Material....., Thickness....., Surface.....
   Sq. Ft.
   (*e*) Floor, Material....., Thickness....., Surface.....
   Sq. Ft.
   (*f*) Ceiling or Roof, M't'l....., Thickness....., Surface.....
5. What surface is exposed to sun? (*a*) Roof.....Sq. Ft.
   (*b*) Walls—South, Windows.....Sq. Ft., Wall.....Sq. Ft.
   Walls—West, Windows.....Sq. Ft., Wall.....Sq. Ft.
6. Are surrounding rooms at other than normal temperature or is room on ground?.....
7. What sources of heat are there? (*a*) People No.....
   (*b*) Actual Power.....H.P., or Maximum Demand.....K.W.
   (*c*) Lights, No....., Rating.....Watts.
   (*d*) Material entering room, Kind.....
   Amount per hr.....lbs., Temp.....° F.
   (*e*) Other sources as burning gas, ovens, hot pipes.....
8. Is there evaporation of water or other liquid?.....
   Liquid....., Amount per hour.....lbs.
9. Is the room tight? (*a*) Openings to Outside or other Rooms.....,
   (*b*) Cracks around windows, doors.....
10. What electric current is available?.....
    .....Volts, ...Cycle, ...Phase.
11. At what pressure is steam available?.....Pounds.
    Gravity or Vacuum Return?.....
    Is steam available all year around?.....
12. Inclose sketch or print showing plan and elevation of room and indicate where units could be located and where they could obtain fresh air if needed. Indicate particularly windows, arrangement of material, furniture, or machinery that might offer obstruction to air currents.
    Mark North.

Offices for your convenience

Carrier Engineering Corporation

Executive, Engineering and General Offices
Laboratories and Shops
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Newark, N. J.

Willis H. Carrier, *Pres.* Phone TErrace 3600 J. I. Lyle, *Gen. Mgr.*

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AIR CONDITIONING AND DRYING EQUIPMENT

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Vice-Pres. in Charge of Sales
E. T. Lyle — A. C. Buensod
R. T. Tree — H. H. Pease
H. A. Terrell — J. R. Duncan
G. W. Hersh — P. R. Rose
F. H. Beckman — H. B. Gulick

BOSTON
Statler Bldg.
Phone Liberty 6994
Herman Worsham

CLEVELAND
Union Trust Building
Phone Main 479
H. B. Matzen — H. M. Rudio

KANSAS CITY
Manufacturers Exchange Building
Phone Victor 5508
Edgar S. Miller — O. B. Thompson

PHILADELPHIA
Land Title Building
Phone Rittenhouse 0818
P. L. Davidson — S. E. Lyman
W. A. Borneman — A. P. Shanklin

CHICAGO
Burnham Building
Phone State 3646
E. P. Heckel — J. H. Bailey
H. B. Forbes — E. Nesdahl
W. H. Moler

LOS ANGELES
911 Mateo Street
Phone Tucker 2927
L. H. Polderman — A. H. Simonds

WASHINGTON, D.C.
Washington Loan & Trust Bldg.
Phone Main 8113
Herbert Coward

FOR EXPORT
15 Park Row, New York
Phone Barclay 8096
Grenville A. Harris

Carrier Engineering Company Ltd

London	24, Buckingham Gate	S. L. Groom, Managing Director
Paris	Elysee Building	Rene Modiano
Bombay	Exchange Building	C. T. G. Hooper
Johannesburg	Cullinan Building	J. H. Veasey

Carrier Lufttechnische Gesellschaft

Stuttgart — 61 Lange Strasse — Dr. Ing. Albert A. Klein

QUESTIONNAIRE

QUESTIONNAIRE

for Carrier Unit Air Conditioner Application

Air conditioning capacity cannot, in general, be calculated on the basis of square feet of floor space or upon the cubical content of a room. It is based, rather upon the quantity of heat to be supplied or absorbed and the conditions to be maintained.

For your convenience and ours, we have outlined the following set of questions. Most of these can be answered from your general knowledge of the plant. Some may require that measurements be made and other data taken.

Name .....

Address .....

1. **For what is the room used?** .....
2. **What conditions are desired?** (a) Temperature.....°F.
   (b) Humidity.....per cent.
3. **What size is room? Long**....., **Wide,**....., **High**.....
4. **On what floor of building is room located?** .....
5. **What construction is room?**
   (a) Windows—Single.....Sq. Ft., Double.....Sq. Ft.
   (b) Skylight—Single .....Sq. Ft., Double.....Sq. Ft.
   (c) Outside wall, Material....., Sq. Ft....., Thick....., Surf.....
   (d) Partition, Material....., Sq. Ft....., Thick....., Surf.....
   (e) Floor, Material....., Sq. Ft....., Thick....., Surf.....
   (f) Ceiling or Roof, Mat'l....., Sq. Ft....., Thick....., Surf.....
6. **What surface is exposed to sun?** (a) Roof.....Sq. Ft.
   (b) Walls—South, Windows.....Sq. Ft., Wall.....Sq. Ft.
   Walls—West, Windows.....Sq. Ft., Wall.....Sq. Ft.
7. **Are surrounding rooms at other than normal temperature or is room on ground?** .....
8. **What sources of heat are there?** (a) People No.....
   (b) Actual Power.....H.P., or Maximum Demand.....K.W.
   (c) Lights, No....., Rating.....Watts.
   (d) Material entering room, Kind.....
   (e) Other sources as burning gas, ovens, hot pipes.....

From this information, our Engineering Department will estimate carefully the required air conditioning capacity and will submit to you the price of the Unit or Units and Controls which are found necessary.

Carrier
AIR CONDITIONING AND DRYING EQUIPMENT

Carrier Engineering Corporation

Newark, N. J.

Amount per hr.....lbs., Temp.....

9. Is there evaporation of water or other liquid?.....
Liquid....., Amount per hour.....lbs.

10. Is the room tight? (a) Openings to Outside or other Rooms.....,
(b) Cracks around windows, doors....., Type of sash.....

11. What electric current is available?.....
.....Volts, ...Cycles, ...Phase.

12. At what pressure is steam available?.....Pounds.
Gravity or Vacuum Return?.....
Is steam available all year around?.....

13. Inclose sketch or print showing plan and elevation of room and indicate where units could be located and where they could obtain fresh air if needed. Indicate particularly windows, arrangement of material, furniture, or machinery that might offer obstruction to air currents. Indicate North by arrow on sketch.

DEHUMIDIFYING

14. If it is desired to maintain temperatures lower than a maximum of from 80 to 85° F. in the Summer, or to dehumidify the air, the use of refrigeration or cold water will be necessary. In this case, answer the following questions:

(a) Are you able to supply cold or refrigerated water to the room?.....
(b) What temperature?..... (c) How much water?.....
(d) What refrigeration capacity have you at present and what portion of this may be spared for water cooling?.....
(e) Do you wish us to submit an estimate for the installation of necessary refrigeration? .....

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